

## REMARKS

Reconsideration of the application is respectfully requested for the following reasons:

1. New Matter Objection and Rejection Under 35 USC §112, 1<sup>st</sup> Paragraph (Written Description)

According to the Examiner, the phrase “*illuminating the oversampled complex image by an optical wave (DIF)*” is not supported by the original specification, which “*only teaches to simulate the illumination of the optical wave (DIF) on the complex image. . .*”

As a result, claims 1 and 14 have been amended to recite –*simulating illumination of the oversampled complex image by an optical wave (DIF)*–, thereby clearly overcoming the new matter objection set forth in item 4 on page 2 of the Official Action and the rejection under 35 USC §112, 1<sup>st</sup> Paragraph set forth in item 6 on page 3 of the Official Action.

2. Rejection Under 35 USC §112, 1<sup>st</sup> Paragraph (Enablement)

This rejection is respectfully traversed on the grounds that the specification in fact enables the ordinary artisan to “*compute a set of two-dimensional images representing the object as seen from respective different viewpoints in the three-dimensional geometrical space, each of said two-dimensional images representing the object as seen from one of said different viewpoints.*” There may be sets of two-dimensional images that cannot be computed, but there certainly is “a set” that can be computed, as claimed.

In the Official Action, the Examiner explains that “*the specification fails to teach that the set of two-dimensional images are produced at ANY place. . .*” and that the “*element holograms are viewed from ANY viewpoints in the three-dimensional geometric space.*” However, the claim does not require that the images be produced as ANY place, or that the holograms be viewed from ANY viewpoints. This argument is illogical for a number of reasons:

1. 35 USC §112, 1<sup>st</sup> Paragraph does not require a specific teachings of every possibility covered by a claim, but rather simply requires that at least one enabled embodiment be disclosed. The Examiner in fact acknowledges that the disclosed embodiment is enabling, the rejection being based on the failure to limit the invention to the disclosed embodiment and not on the lack of enablement provided by the disclosed embodiment.
2. There is no inherent reason why the holograms of the claimed invention cannot be constructed on shapes other than planes, and an infringement should not be able to design around the invention simply by using other shapes. In fact, even though the previously applied Haines patent fails to teach all features of the claimed invention, as discussed in the last response, it does show that **a hologram can be constructed in a surface taking on any shape and located anywhere relative to the object**. As explained in col. 4, line 5 of the Haines patent, *"In general the surface 50 may take on any shape and may be located anywhere relative to the object 30."* **There is no reason why the claimed invention could not be similarly constructed.**
3. The Examiner refers to pages 2 and 3 and Fig. 4 of Applicant's disclosure in support of the assertion that the invention is limited to the illustrated embodiment of parallel planes. However, pages 2 and 3 describe the claimed invention without even mentioning the limitations alleged by the Examiner to be critical, while Fig. 4 simply shows a preferred embodiment of the invention.

On page 3 of the Official Action, the Examiner specifically acknowledges that the specification gives support for two dimensional images defined in a particular first geometric plane and images defined by viewing the object from different view points located in a second geometric plane, where the first and second geometric planes are parallel to each other. The Examiner is correct that the specification does in fact enable the skilled artisan to compute a set of two-dimensional images representing the object as seen from respective different viewpoints in three-dimensional geometrical space, as claimed.

The Examiner's mistake is in the allegation that the specification ONLY gives support for the above limitations. Nowhere does the specification state that the application is so limited, and nothing in the record except the Examiner's allegation indicates that it is. It is the Examiner's burden to establish that limitations is critical, and the Examiner has not done so. Instead, it appears that the so-called "enablement" rejection is simply an attempt to limit the claims to specific aspects of the disclosed invention arbitrarily selected by the Examiner, *i.e.*, the Examiner wishes to restrict the scope, and therefore the value, of Applicant's invention in a manner that is not dictated by the prior art.

The MPEP clearly prohibits attempts to arbitrarily limit the invention to the preferred embodiment by calling limitations "critical" and using 35 USC §112, 1<sup>st</sup> Paragraph to force their inclusion. For example, MPEP 2164.08(c) states that:

*Limiting an applicant to the preferred materials in the absence of limiting prior art would not serve the constitutional purpose of promoting the progress in the useful arts. Therefore, an enablement rejection based on the grounds that a disclosed critical limitation is missing from a claim should be made only when the language of the specification makes it clear that the limitation is critical for the invention to function as intended. Broad language in the disclosure, include the abstract, omitting an allegedly critical features, tends to rebut the argument of criticality.*

Nothing in the present specification suggests that the limitations are critical. While the disclosed embodiment might be the most computationally convenient way to carry out the invention, it is not impossible that conditions could be varied and still result in a hologram.

It is noted that in the **four** previous Official Actions and during the interview, the Examiner did not indicate that there was an "enablement" problem even though the claims have not change substantially in scope. The Examiner did indicate during the interview that she felt that adding a computation step would make the claim more "solid" with respect to the prior art, but she did not suggest limiting the invention to computation and viewing in parallel planes. In view of the constantly shifting rejections, the Applicant has to wonder whether amendment of

the claims to include the limitations suggested by the Examiner would simply invite another arbitrary requirement for more limitations.

Furthermore, it is noted that the limitations mentioned by the Examiner, such as parallel planes, are in fact recited in various claims such as claim 2, **and yet claim 2 is also included in the rejection**. It is impossible to determine from the rejection exactly what limitations the Examiner considers to be critical and that need to be added to claim 1. Does the Examiner want the entire specification added? The Applicant believes that such a require is improper.

Instead, because one of ordinary skill in the art would have been “enabled” by the original disclosure to:

- compute a set of two-dimensional images representing an object as seen from different viewpoints in three-dimensional space (the previously-applied Haines patent teaches how to computer two-dimensional images, albeit through the use of windows that restrict the field of view to parts of the object—it should be no more difficult to computer images of the whole object than images of part of the object),
- computer a set of elementary holograms, each corresponding to one of the two-dimensional images (computing holograms is well-known, the Haines patent providing one example), and
- combining the images (again, see the Haines patent),

it is respectfully submitted that the requirements of 35 USC §112, 1<sup>st</sup> Paragraph are met. None of individual limitations is difficult for the skilled artisan, and while the overall combination might not have been known, the skilled artisan could easily have been able to implement the combination. Therefore, withdrawal of the rejection of claims 1-25 under 35 USC §112, 1<sup>st</sup> Paragraph is respectfully requested.

3. **Rejection of Claims 7, 8, and 19-20 under 35 USC §112, 2<sup>nd</sup> Paragraph**

The rejection set forth on pages 4-5 of the Official Action has been addressed as follows:

- Claims 1 and 14 have been amended to recite “simulating illumination of the oversampled complex image,” thereby overcoming the lack of antecedence for the simulation step and means recited in claims 7 and 19.
- Claims 7, 8, 19, and 20 have been amended to more specifically recite the functions with respect to which the transforms are performed.

4. Claim Objections

The objections set forth on pages 5-6 of the Official Action are addressed as follows:

- The symbols  $(O,x,y,z)$  and  $f_{nm}(Y,Z)$  have been deleted.
- The phrase “*wherein each of said two-dimensional images is defined by a real function*” has been replaced by –*wherein each of said two-dimensional images comprises coordinates  $(Y,Z)$  and is defined by an intensity distribution over said coordinates*–. It is noted that the Examiner’s suggestion of reciting the intensity profile of the projected image on a second geometric plane has not been adopted because projected images described in the specification are merely an example for, and not a portion or component of, the two-dimensional images.
- As noted above, the “illuminating” clause has been re-written to recite –simulation of illumination. . .–.
- “*Complex two-dimensional image*” has been changed to –*complex image*– throughout the claims for consistency.
- The objection to the phrase “*extracting amplitude values of the sum of said complex field and the resulting diffracted image to produce the hologram,*” on the grounds that the hologram is not produced by the amplitude values of the sum but rather the amplitude values of the **interference** field, is respectfully traversed on the grounds that the claimed sum (of the complex field representing a reference optical wave *and* the resulting diffracted image) in fact yields the **interference** field referred-to by the Examiner.

It is believed that the above comments address each of the new objections raised by the Examiner, but should the Examiner feel that further changes are necessary, the Examiner is invited to contact the undersigned at any time to discuss the changes.

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5. Rejection of Claims 1, 4, 6-14, and 19-26 Under 35 USC §103(a) in view of “Fourier-Transform Computer-Generated Hologram: A Variation ON The Off-Axis Principle” (Michelin) and U.S. Patent No. 5,668,648 (Saito)

This rejection is respectfully traversed on the grounds that the Michelin article and Saito patent both fail to disclose or suggest:

- computing a set of two-dimensional images representing an object as seen from different viewpoints in three-dimensional space;
- computing a set of elementary holograms, each corresponding to one of the two-dimensional images; and
- combining the holograms to form a hologram of the object.

Instead, Michelin article is directed to the use of Fourier transformation to compute amplitude transmittance from complex fields representing a reference wave, and contains no suggestion whatsoever of constructing a hologram from two-dimensional images, much less two-dimensional images that represent the entire object in the manner claimed. Moreover, the Saito patent is directed to the use of Fourier transforms to generate diffraction elements that might make up a hologram, and also contains no suggestion whatsoever of constructing a hologram from two-dimensional images representing an entire object, as claimed.

Even though neither reference teaches or suggests the claimed computation of two-dimensional images representing an object as seen from different viewpoints in three-dimensional space, and combining holograms representing the images to form a hologram of the object, the Examiner believes that *“such modification would have been obvious to one skilled in the art since the modification only requires repeating the same calculation process for different two-dimensional image information for the benefit of producing a composite hologram from a composite two-dimensional image information,”* as explained on page 7 of the Official Action, in the first complete paragraph. The Examiner’s rationale for the modification of the prior art, i.e., that the modification is simple to carry out (“only requires repeating the same calculation process for different two-dimensional image information”) and has benefits (“for the benefit of producing a composite hologram”) is classic hindsight.

Basically, the rejection is not based on any teachings in the prior art, but rather on the Examiner's conclusion, having read Applicant's specification and claims, that the invention is obvious because it "only requires" repeating the same calculation. This basis for rejection is not only conclusory, but it is also wrong since it ignores the fact that the images the calculations are performed on, namely two-dimensional images of an object seen from different viewpoints in three-dimensional space, are also not taught by the prior art. It is not proper to substitute a hindsight judgment that the invention is a simple modification of the prior art for an actual teaching of the modification, and there is clearly *no* teaching of the claimed modification. The prior art only teaches what is being modified, namely formation of holograms using certain transforms, and not the modification, forming the hologram by combining holograms of two-dimensional images of an object taken from different viewpoints in three-dimensional space.

The impropriety of basing a rejection on hindsight determination that a modification *could have been made* because of the advantages of the modification and not because of any prior art teachings of the modification, is explained in numerous court cases and in the MPEP. See, for example, *In re Fritch*, 23 USPQ2d 1780,1783 (Fed. Cir. 1992), cited in MPEP 2143.01 III, which points out that

*'Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so [quoting ACS Hosp. Systems, Inc. v. Montefiore Hosp., 221 USPQ 929,933 (Fed. Cir. 1984)].' Although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious 'modification' of the prior art. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.*

In other words, while the Examiner may believe that the invention is too simple to be non-obvious and *should* be taught by the prior art, the rejection is not proper unless the invention (combining holograms of two-dimensional images taken from different viewpoints in three-dimensional space) in fact is taught by the prior art. The fact that the invention "only" requires repeating certain steps is not a proper basis for rejection if the prior art does not teach those steps

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(computing holograms on two-dimensional images of an object seen from different viewpoints). To the contrary, the alleged simplicity of the invention combined with the lack of any teachings of the invention is an indication of non-obviousness rather than obviousness. As a result, it is respectfully submitted that the rejection of claims 1, 4, 6-14, and 19-26 under 35 USC §103(a) is improper and should be withdrawn.

Having thus overcome each of the rejections made in the Official Action, withdrawal of the rejections and expedited passage of the application to issue is requested. Should the Examiner nevertheless feel that issues remain that could possibly be resolved in a personal or telephonic interview, the Examiner is invited to contact the undersigned at any time to conduct or arrange such an interview.

Respectfully submitted,

BACON & THOMAS, PLLC

A handwritten signature in black ink, appearing to read 'B U', followed by a long horizontal line extending to the right.

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